JPRS 76587

8 October 1980

East Europe Report

SCIENTIFIC AFFAIRS

No. 684

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CONTENTS

STATE OF HUNGARIAN, CEMA INTERFERON RESEARCH, PRODUCTION REVIEWED

Budapest HETI VILAGGAZDASAG in Hungarian No 34, 23 Aug 80 pp 33-35

[Interview with Dr Istvan Foldes, head of the Microbiological Research Group of the Hungarian Academy of Sciences]

[Text] Dr Foldes is 58 years old. He has been directing the 45-member research group dealing with interferon and tumor virus research since 1973. In addition to the foregoing, Dr Foldes is coordinator of collaboration in the interferon research being conducted by the academies of sciences of the CEMA countries. In the following, he tells the reporter of HVG--HETI VILAGGAZDASAG--what progress Hungarian scientists have made in their investigation of interferon.

[Question] Let me begin with the question of greatest interest to the public. Are interferon preparations available in Hungary and has there been any success in curing cancer patients with interferon?

[Answer] Briefly, not at present. New drugs may be used on humans in our country, quite rightly, only after extensive testing and checking. Production and testing of interferon are still in the experimental stage. However, this does not mean that no one in Hungary has received interferon preparations. I am aware of the fact that a certain quantity of such preparations were obtained through connections from Finland for the treatment of cancer patients. I must add that since interferon has received such wide and, in some cases, irresponsible and misleading publicity in the press, our institute has been besieged daily by the sick and their relatives, even by physicians, with demands that we make interferon available to them. We are under great pressure and we feel that it is up to the press to inform the public correctly.

[Question] I don't wish to go into the matter of information policy, but according to what you have said, you are dissatisfied with interferon propaganda.

[Answer] You must realize that in this area, as in all kinds of research, progress has to be made step by step. Biologists must advance beyond partial issues which seem nonessential to them before they can present for

the finished material. What I mean is that they [reporters] should search for reality rather than the sensational. We could say nothing about interferon and then the public would have nothing to question. However, I feel that this is the wrong approach. Instead, people should understand that we are dealing with a medication highly significant on a long-term basis, but that is is still being tested and it is necessary to wait until it has been determined for what diseases and under which circumstances it can be used.

[Question] Is interferon being produced in Hungary?

[Answer] Inteferon is being studied at the Institute of Microbiology of Szeged Medical University as well as by the Microbiological Group of the Hungarian Academy of Sciences. The interferon needed for experiments conducted by our Group is produced largely by us; we are self-suppliers, so to speak. However, a process for the production of interferon has already been evolved at Szeged and, to the best of my knowledge, discussions are under way with the United Pharmaceutical and Nutriment Factory concerning the manufacture of raw interferon. It has been suggested that the preparation thus obtained should be sent abroad for purification. I can say nothing specific about the rentability of production. However, I will note that I stated as early as 1977 that domestic research on interferon should be concentrated and expanded. Doing this would have resulted in considerable economic as well as scientific gains. Unfortunately, the idea was stillborn so that we are lagging somewhat in this area. The Kari Cantell laboratory of Helsinki which has pioneered the preparation of interferon for the past 20 years and the Finnish Red Cross are reaping the tremendous income derived from sales of it.

[Question] Are you satisfied with the current status of Hungarian interferon research?

[Answer] A researcher can never be satisfied: this is a kind of professional prejudice. The greatest problem is the cost of interferon research. Actually, the culture media, the tissue cultures used in interferon preparation are the most costly and our situation is made more difficult by the fact that imported chemicals are needed for preparation of such media. Thus the national economic budget determines how much can be spent on interferon research.

[Question] When will interferon finally become a medication?

[Answer] Within 5 years. Raw interferon will be produced first, then purified variations. I am convinced that Hungary will make it, too, and that it will become commercially available here. However, no one should expect us to say today for what illnesses physicians will prescribe interferon preparations.

Last month the CEMA countries agreed on where and how they could collaborate in interferon research. However, no agreement has been arrived at concerning

cooperation in the manufacture of interferon. Nevertheless, some socialist countries have begun experimental production of interferon.

According to information received from the Microbiological Group of the Academy, the Soviet Union han not only produced raw interferon, but preparations made from it are available on prescription there. At present these preparations are being used solely for treatment and prevention of certain viral infections such as influenza. They cannot be used for the treatment of tumors.

Physicians from Zagreb report that experiments indicate that interferon is especially effective in treatment of cancers of the cervix and the breast. However, extensive and thorough testing has not begun there yet either.

CSO: 2502

BRIEFS

CSSR AIRLINER FOR USSR--Czechoslovakia and the USSR signed recently an intergovernmental agreement on development of a new airliner designated L 610. The LET aircraft factory in Uherske Hradiste, which has been producing L 410 UVP airliners for the USSR, expects to produce the L 610 within the Eighth Five-Year Plan (1986-1990). Most of the L 610 aircraft will be delivered to the USSR. [Prague MLADA FRONTA in Czech 4 Sep 80 p 2]

CSO: 2402

REPORTS ON SCIENTIFIC ACTIVITIES

Original Metallurgical Method

Sofia BULGARIA TODAY in English No 9, 1980 p 20

[Article by Roumen Ivanchev: "An Original Metallurgical Method"]

[Text] In recent years there has been an ever greater drive to shorten the road along which scientific developments travel from the research institutes to the industrial enterprises. At Plovdiv's Dimiter Blagoev Non-Ferrous Metal Combine, this road has been cut down enormously, both literally and figuratively speaking. Next-door to the plant is the five-storey building of the Non-Ferrous Metal Research Institute. Its employees are ready at any time to take off their white overalls and put on the black aprons of metallurgical workers and take you to their spacious laboratory, the combine itself. Let us try to follow the path along which zinc concentrate goes until it turns into silver-white metal blocks bearing the respect-inspiring figures 99.96, 99.975 or 99.99, which denote the purity of the metal. Chemical engineer Ivan Enchev and his research team have evolved an original method for the electric extraction of non-ferrous metals and their alloys. It has already been patented in the USSR, Japan, the USA, Canada, Beligum, Spain and Austria.

Chemically pure metals are electrically extracted in electrolytic baths. The hydroactive method, used by more than 70 per cent of the world's zinc producers, while having doubtless advantages, such as high purity of the final product, lower environmental pollution and easy servicing, has at the same time a big drawback: it consumes a tremendous amount of electricity.

The new method is based on alternating polarity of the electric current, which results in reversive currents. According to a pre-set programme, brief spurts of electricity are charged in a direction counter to that of the main current. This brings about big alterations in the electrical chemistry of the extraction, helping to achieve a smooth

metal surface, a reduced voltage between the electrodes, and lower electricity consumption. It also lowers the degree of zinc's oxidation in the inductive furnaces. The new method has increased productivity up to two-fold, and has cut electricity consumption by about 100 kWh per ton of zinc. Another great asset is that the new method can be easily introduced without great alterations in the standard electrolytic equipment.

The new method is already being successfully used in copper purification at the Georgi Damianov Copper Mill in the town of Srednogorie, and has been sold as a licence to several leading manufacturers abroad. It has been awarded gold medals at international fairs in Plovdiv, Brussels and Nurnberg. Two years ago, the Spanish Asturiana de Zinc Company bought the licence for reversive electric extraction. Last year, the circuit of the reversive rectifier, which is one of the main components, was tested jointly by Bulgarian and West German experts, and proved to have perfect qualities.

It is sufficient to mention in conclusion that about four million tons of zinc are produced on our planet each year, in not more than 60 modern plants.

ROUMEN IVANCHEV
Mechanical Engineer

Ion 50 Process

Sofia BULGARIA TODAY in English No 9, 1980 p 21

[Article by Zhivko Dinkov, Dimitrov Prize Laureate: "A High Achievement"]

[Text]

A modern and very promising method of chemico-thermal surface processing of machine parts and tools has been ever more widely used in Bulgaria in recent years. Known as ion nitrogenation, the method has been enjoying enormous popularity in industry, and has successfully replaced the old, unprofitable and time-consuming process of the conventional gaseous nitrogenation; it has also shown what the future trends in chemico-thermal processing of metals are likely to be.

When this ion nitrogenation method is used, the metal parts which are placed in a vacuum are saturated with nitrogen by the surrounding bluish-violet low-temperature plasma; thus their surface becomes extremely hard and they are more lasting, with a longer exploitation lifetime. The main advantages of ion nitrogenation are: a three- to five-fold reduction in the time taken for the whole process, an even spread of the hard surface layer regardless of the configuration and size of respective parts, the regulated formation of that layer according to technological requirements, a high level of hygiene in the work-place and complete innocuousness for the personnel and the environment.

The first laboratory researches into this method were carried out at the V.I.Lenin Institute of Mechanical Engineering by a team headed by Professor Dimiter Bouchkov, D.Sc. In spite of the numerous difficulties in research, development, technology and technique, the method which is still a novelty in world practice, was quickly transferred into industrial practice on a wide scale. The installations necessary for using this method are produced in a range of 15, 50, 100 and 150 kW output power, according to the different requirements in industry. Fifteen installations for ion nitrogenation have already been brought on stream in Bulgarian plants.

Many companies from abroad are already showing interest in these installations of Bulgarian make. At the Leipzig International Fair in March 1980, the ION-60 installations were awarded a gold medal. The Machinoexport Co. of Sofia is at present fulfilling several orders placed for such installations by foreign customers.

ZHIVKO DINKOV
Dimitrov Prize Laureate

Silverless, Micro-electronic Innovation

Sofia BULGARIA TODAY in English No 9, 1980 p 21

[Article by Vassil Simeonov: "New Elements to an Old Scheme"]

[Text]

About thirteen years ago the Bulgarian scientist Yordan Malinovski added essentialy new elements to the scheme which then seemed adequately to reflect the photographic process in the sensitive films with coatings of silver salts. His discovery was a challenge to the photographic tradition of that time. He proved that besides using the expensive silver salts which are in short supply in the world, one can use other compounds sensitive to light in photography. Wide interest was shown in the new photographic system – films which were not emulsions of gelatine and silver bromide but ones which were obtained in evaporation in a vacuum of silver bromide, tin iodite, tin bromide, thallium compounds and arsenic sulphides. The advantages of the new materials in electronics appeared obvious in theory – much finer details could be recorded on these films and their separating qualities would surely be a hundred times better than those of the emulsion plates. The way was thus paved for the silverless systems and for photographic materials to be applied in micro-electronics.

That was a scientific discovery which came in response to the requirements in practice. It should be pointed out, however, that here it was not a matter of ordinary photography which at that stage was hardly threatened by competition from the silverless systems. But in microelectronics the innovation was of great significance.

At present Yordan Malinovski is a corresponding member of the Bulgarian Academy of Sciences, a professor, doctor of chemistry, Laureate of the Dimitrov Prize, honorary member of the Royal Photographic Society (Great Britain), member of the editorial boards of prestigious scientific journals. The Central Laboratory of Photo Processes (CLPP) with the Bulgarian Academy of Sciences is a special academic unit, comprising traditional research laboratories and studies. It has vacuum installations, ingenious process-lines, pilot installations for semi-industrial experiments and bright halls equipped with modern apparatuses.

Visitors to the Academy from abroad make a point of seeing this laboratory. They often ask: 'Has all this been

created without any previous experience in this field? Are all the people here working on the same problem?' They invariably say they are sure that the work in these conditions is bound to produce good results. But are these just flattering comments made by courteous guests? The achievements of the laboratory have been qualified as 'phenomenal' by the 'big noises' in the science of photography at the International Symposium on Research into the Photoprocess and at the International Congresses of Photography in Dresden and Rochester (seat of the prestigious Kodak firm).

Yet another criterion of the value of the Bulgarian invention is the large number of patents for various silverless photographic systems issued in the FRG, Italy, Britain, Belgium, France and the USA.

Professor Malinovski spends only a short time in the office allotted to him as laboratory director.

He is a theoretician having made an outstanding contribution to the theory of the photographic process. He is an experimenter having built his theory on experience gained in practice, which he believes is the most essential thing. He is an organizer. Few people would dare take a path full of uncertainties to something no one before had attempted to create.

The laboratory is now developing technologies for the production by evaporation of films of silver bromide and compounds containing no silver - photographic material intended for the requirements of microelectronics, printed circuit 'memories' of computers, lithographic materials and materials for further research into the photographic process. It is a responsible work placing great demands on the researchers and their team leader. The work of Professor Yordan Malinovski who likes to take part in each experiment, to consider each new idea, is a challenge to the traditions in this field.

VASSIL SIMEONOV

CSO: 2020

TECHNICAL SPECIFICATIONS OF COMPUTER, ELECTRONIC PRODUCTS

Sofia RADIO TELEVIZIYA ELEKTRONIKA in Bulgarian No 9, 1980 inside cover, both sides of back cover

[Advertisements for electronic equipment; photos at end of article]

[Text] The ES9004 Magnetic Tape Data Processor [Inside front cover]

The ES9004 is designed for direct taping of keyed-in data. It provides an opportunity for retrieving a certain data block for checking and when necessary, correcting the taped data.

The unit has a built-in buffer memory which stores the entire data block before being recorded on tape. This makes it possible to immediately correct the input mistakes noted by the operator; this is done by turning back the address of the storage and putting in the correct sign.

The taped data are recorded in blocks 80 or 160 signs long. The device is equipped with interlocking of the keyboard during the taping and read cycle after recording, and this makes it possible for the operator to maintain a constant pace in keying in the data.

During the record cycle, the contents of the buffer storage are not destroyed. The data are kept for checking and this is done by direct reading after recording. The read data from the tape are compared bit by bit with the data stored in the memory.

In the "check" mode, the data blocks which are to be checked are read and fed into the storage one by one. Each sign of the block is re-entered by the keyboard from the source document. The code of the introduced sign is automatically compared with the storage code. If the two codes are the same, the operator can continue the check.

In the "retrieval" mode, a given data block is retrieved automatically by comparing each taped block with an identifier which has been keyed in previously into the storage. Retrieval is carried out at a speed of approximately 1000 blocks per minute.

Each EU9004 can be equipped with a block indicator for the current data block.

At the client's request, the EU9004 can carry out the following functions:

1) The possibility of transferring data from one unit to another;

2) The possibility of reprinting the data recorded on tape of the printer;

3) The possibility of feeding in data from a punch card reader.

Technical Specifications:

Bit density	--32 bit/mm
Recording method	--NPZ-1
Tape speed	--39.2 cm/s
Capacity of buffer storage	--160 bytes
Block length	--80 and 160 bytes
Recording format	--IBM system
Basic operating modes	--data input, check and retrieve
Other modes	--input of program, program check, print, input from punch card reader
Programs	--two independent ones
Indication	--block-by-block
Automatic functions	--doubling, fast-forward, fast-back
Power	--220 V ±10%

Exporter: Izotimpex VTO
51 Chapaev Street
Sofia Bulgaria
Telephone: 73-61
Telex: 022731, 022732

The IZOT 250 Office Computer [Inside back cover]

The IZOT 250 office computer is a modern device for processing economic information. It possesses high technical and economic indicators and a high calculating speed. The IZOT 250 office computer uses MOS integrated circuits with a high degree of integration. The use of the floppy disc storage makes is possible to reprocess the information in a minicomputer or a large electronic computer.

Technical Specifications

Control Unit	
Internal storage	--12 K
Permanent storage	--16 K
	--512 independent digital registers; 256 text registers, 10 constant registers

Arithmetic operations	--addition, subtraction, multiplication, division, percentages;
Bit length	--14 bit units
Display	--digital for inputting data and intermediate results; working--for state of system.
Keyboard	--alphanumerical (Latin and Cyrillic); working; digital.
Printer	--speed 30 signs per second; 156 signs per line; 380 mm paper width; tabulating; changeable printing disc; uses punch paper and blanks.
Floppy disc storage	--250 K per disc; 77 tracks.
Power	--220 V, 50 Hz.
Programming	--with a specialized problem-oriented input language (easily learned with a minimum knowledge of programming) and it has a built-in translator

Exporter: Izotimpex VTO
51 Chapaev Street
Sofia Bulgaria
Telephone: 73-61
Telex: 022731, 022732

M-101 Digital Multimeter [Outside of back cover]

The M-101 digital multimeter is designed to meter direct and alternating voltage, direct and alternating current and resistance.

It is to be used in industrial and scientific laboratories, production shops, school labs, service bases and elsewhere where a combined portable device is required. It is designed with integrated circuits.

Technical Specifications:

Metering of direct voltage:	--ranges 0.2, 2, 20, 200, 1000 volts.
Metering of alternating voltages: (from 50 Hz to 10 kHz):	--ranges 0.2, 2, 20, 200, 750 volts.
Metering of direct current:	--ranges 0.2, 2, 20, 200, 2000 mA.
Metering of alternating current (from 50 Hz to 10 kHz)	--ranges 0.2, 2, 20, 200, 2000 mA.
Metering of resistance:	--ranges 0.2, 2, 20, 200, 2000 kΩ.
Dimensions:	--270x150x 82 mm.
Weight:	--1.9 kg.

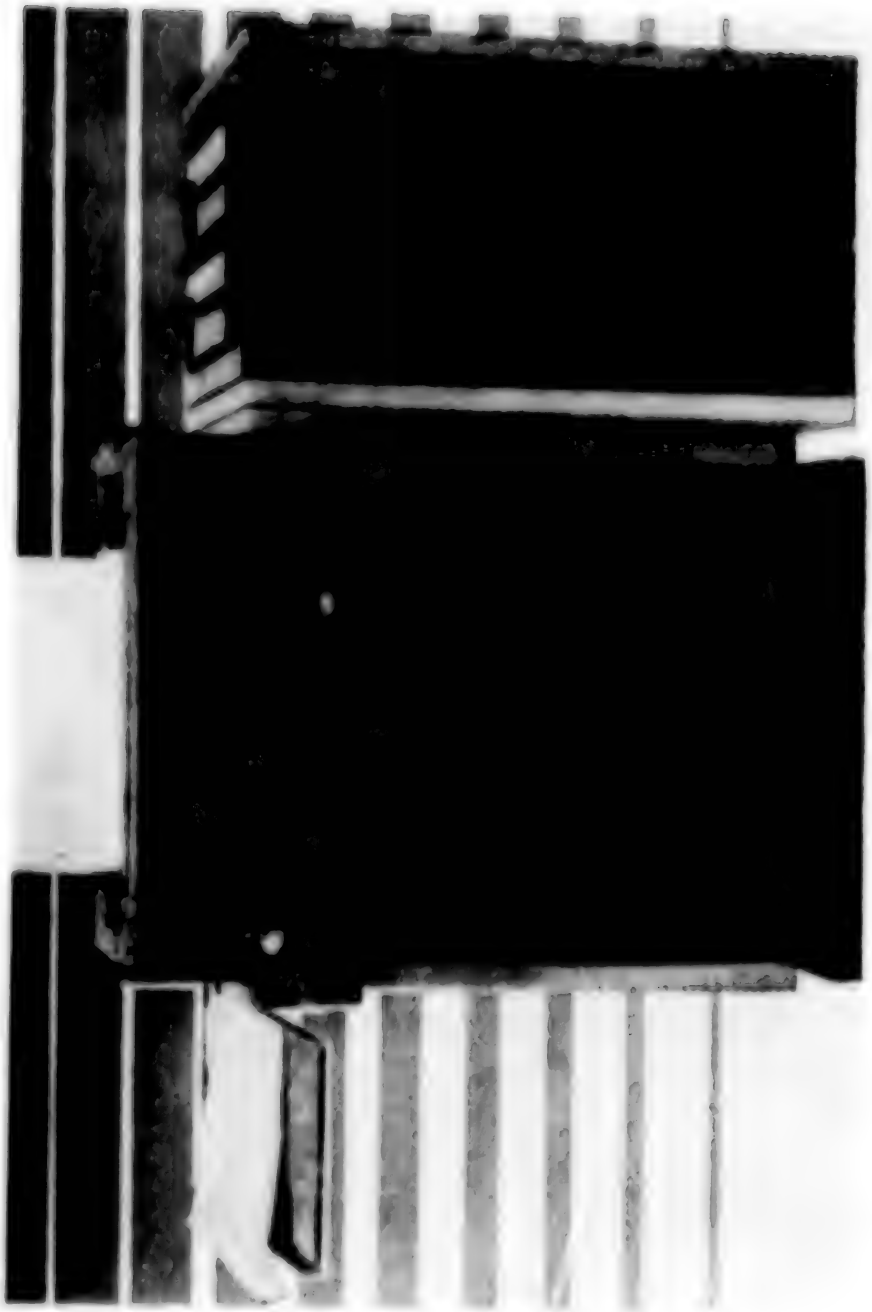
Producer: Pravets Instrument Building Plant

Exporter: Isotimpex VTO

[Photographs]

ES9004 Tape Processor

IZOT 250 Office Computer



M-101 Digital Multimeter

10272
CSO: 2202

BRIEFS

ORE DEPOSITS DISCOVERED IN MORAVIA--Preliminary geological investigation in the gold-bearing area of Zlata Hora-West has revealed a deposit of about 10 tons of gold. Prognosis by geologists from Prague Charles University of large deposits of lead, zinc, copper and silver in the Svratka Dome [Svratecka klenba], Moravia, has been confirmed by experts from GEOINDUSTRIE in Jihlava. Preliminary estimates point out to deposits of about 15-25 million tons of lead, zinc and silver-bearing ores. Also promising are the areas of Lacnov, Jesenice and Domasov-Lazanky, where geological investigation has been in progress. The biggest surprise to experts is the rather high content of silver in some of the ores. After depletion of the Pribram silver-bearing deposits, the new deposits represent a great hope for the CSSR economy. Prognosis prepared by Czechoslovak geologists more than 3 years ago gives the CSSR a realistic target to increase by 1990 production of lead and antimony 3-fold, copper 2-fold, zinc 3.6-fold, tin 7.6-fold, iron by 130 percent and tungsten by 180 percent. [Prague ZEMEDELSKE NOVINY in Czech 24 Sep 80 p 1]

TURBOGENERATORS FOR CUBA, EGYPT--SKODAEXPORT will deliver three additional turbogenerator sets to the Nuevitas power station in Cuba. Output of these three sets will be 125 megawatts. The second turbogenerator set passed tests and is being shipped to Cuba. The previously delivered three turbogenerator sets have an output of 64 megawatts. Skoda Works in Plzen have also delivered two 110-megawatt sets to Egypt, which have been operational at Kapr el Davar. A third set is being installed and the fourth one is slated for delivery in the next few months. [Prague LIDOVA DEMOKRACIE in Czech 23 Sep 80 p 3]

INDUSTRIAL ROBOT PRODUCTION EFFORT--Czechoslovakia began development of industrial robots about 10 years behind other developed countries. Through accelerated effort in this field approximately 3,000 industrial robots and manipulators are expected to be manufactured and utilized in production by 1985, their number reaching 30,000 by 1990. [Prague SVOBODNE SLOVO in Czech 3 Sep 80 p 1]

CSO: 2402

BACKGROUND OF HUNGARIAN PARTICIPATION IN SPACE RESEARCH HIGHLIGHTED

Budapest NEPSZABADSAG in Hungarian 24 Aug 80 p 15

[Article by Pal Gabor Peto: "How Many Hungarian Astronauts Are There? The Social Background to Hungarian Space Research: KASZ"]

[Text] When we say Hungarian space pilot, everyone naturally thinks first of Bertalan Farkas, the research space pilot of the Soyuz 36, and of Bela Magyari, the other trained Hungarian space pilot. Even though it is correct to think of them first, it is a mistake to regard them as the only Hungarian space pilots and space researchers, or in a word, astronauts. (It is because of this word's comprehensive nature that we use the one foreign word instead of the two Hungarian expressions.)

If we interpret the word astronaut in this way, it is more readily understandable when we say that there are several hundred Hungarian astronauts.

On first hearing, this statement may be surprising, but in this way it is true. Let us only think a moment: all those, mostly unheralded, experts who prepared the space flights, constructed the equipment, and made the special materials for the spaceship--who could deny that they, too, are participants in the space flights? And those who process the data coming from artificial satellites for scientific or practical uses? Obviously they are also (land) astronauts, and it would be ungrateful and irrational of us to underestimate their role.

It Was Started by Twenty-Three Men

Astronautics is a complex science, interdisciplinary to use a word frequently heard today, because mathematicians, physicists, astronomers, geophysicists, metallurgists and various kinds of engineers are indispensable participants, as well as geodetists, missile experts, computer technicians, biologists, physicians, and we could continue with the list. In this sense, Hungarians participated in space flights quite a few years before Bertalan Farkas' flight. Many Hungarian pieces of equipment have been flown on Soviet space research missiles and on Intercosmos satellites. Hungarian specialists also participated in processing results. For this very reason it is worth

directing attention to an organization which had an important role in the birth of Hungarian astronautics and which is still today voluntary and self-motivated. Its official name is KASZ (Central Astronautics Department) of the MTESZ (Federation of Technical and Natural Science Association).

At the beginning of the 1950's, astronautics appeared to be a very remote matter, although astronautic associations have functioned in many countries for decades (in the Soviet Union since 1924, in Germany since 1927, in the United States since 1934, and in Great Britain since 1933). But the experts knew that we were on the threshold of the space age, and in fact we were nearing the "International Geophysical Year," which in July 1957 started the great international scientific research cooperation. And they intended to use artificial satellites for research in that very year. The American press wrote excitedly about the world's first artificial satellite, American "naturally." At the 1955 congress of the IAF (International Astronautic Federation) in Madrid, the academician and leader of the Soviet delegation, Sedov, only said sparingly that Soviet experts also were working on making an artificial satellite.

Articles about astronautics slowly increased in the press. Then on 26 May 1956, 23 experts established the Astronautic Committee within the central astronomical department of the TIT (Society for the Propagation of Scientific Knowledge). They elected Gyorgy Kulin, the well-known astronomer, as president; and as secretaries Professor Jozsef Sinka and astronomer Ivan Almar. The members included astronomers, engineers, physicians, physicists, and many other experts.

From a Committee to a Department

Since the committee was a part of the TIT, its members occupied themselves mostly with the propagation of information: delivering lectures and writing articles. They collaborated in writing the first Hungarian book on space flights, "Astronautics," which was published by Gondolat Publishers in the summer of 1957. It could not have been at a better time: on 4 October the first artificial satellite, the Soviet Sputnik, was put into space, and interest in the subject grew to an incredible extent. At the TIT Attila Jozsef Free University a series of 15 lectures was delivered in 1958-1959.

But by then, in addition to information propagation, the seeds of scientific work also began to sprout in the activity of the Astronautics Committee. In April 1958 it organized a 3-day astronautical scientific meeting; it collaborated in the work of the Sputnik tracking stations organized by the MTA [Hungarian Academy of Sciences] Astronomical Observation Institute, and in the exchange of information gained therein. One of the members of the committee, Tibor Horvath, established an artificial satellite tracking station at Rakceliget.

In December 1959 the Astronautics Committee left the TIT and became the Central Astronautics Department of the MTESZ. From many points of view this was an important change, especially because in this way KASZ could now easily draw into its ranks the members of other MTESZ associations, as well as physicians and lawyers, and thus it could begin the exchange of scientific information deriving from the work of its members. The work of KASZ was given impetus by the fact that Albert Fono, corresponding member of the MTA, was elected chairman, as he was also one of the pioneers and outstanding personalities of missile technology. Also joining the leadership were Gyorgy Erdi-Krausz, engineer, who occupied himself with astronautics as early as the 1930's, and Erno Nagy, engineer who spoke a half dozen languages fluently and subsequently delivered lectures on missile technology at the Lorand Eotvos University of Arts and Sciences.

In this period between 1959-1972, which was unfortunately closed by the deaths of Albert Fono and Gyorgy Erdi-Krausz, KASZ expanded into an organization of several hundred people with the participation of KASZ experts and university students. By 1962, under the name of the Hungarian Astronautics Association, it became a member also of the IAF.

To follow results in the field, it was important that KASZ published a collection of foreign-language abbreviations relating to space astronautics, and moreover it worked out the Hungarian terminology. It organized many lectures, conferences and film showings, and it served as the forum for the reports of Hungarian experts who had visited abroad (for example, at congresses).

More important, however, than individual lectures, were the so-called large programs. These consisted of a scientific lecture and discussion series extending over a number of days. Such was the first scientific conference organized in October 1967 with a number of Soviet participants. KASZ has played a great role since 1972 in the organization of the annual Ionosphere-Magnetosphere Seminar, in the deliberations of cosmic geodesy, and in discussions and conferences on remote signal perceptions and the use of artificial satellite photographs.

Famous foreign scientists also frequently hold lectures at KASZ when they travel to Hungary. It has had as guest Todor Karman, the astronautics pioneer of Hungarian origin, academician Petrov, Soviet and American astronauts, and others.

The Fourth Decade

The above-listed lectures and conferences carry us over partly to that phase of KASZ history which began in 1972. Since then, the chairman of KASZ has been Ivan Almar, doctor of physics, and its secretary is Andras Horvath, astronomer and candidate. The work of this period was obviously defined by the accelerating development of astronautics. A number of work committees and local organizations were developed in KASZ; for example, the space law

committee; the "earth-photo work committee," which dealt with questions of evaluating practically the pictures taken from artificial satellites and serving earth-surface and meteorological observations; and the space medicine working committee.

Besides the semiannual ASTRONAUTICS BULLETIN--which carries the articles of domestic and foreign writers and regularly publishes data on space vehicles in orbit--an important publication of KASZ is a series of books on the materials from our big programs and our conferences. Of these about 30 volumes appear every year. And KASZ experts are preparing the "Astronautics Lexicon," a work of 960 pages published jointly by the Academy Publishers and the Zrinyi Military Publishers.

In discussing this manifold activity--without trying to be exhaustive--we must emphasize the characteristic fact that KASZ is the social organization of Hungarian astronautic research. The members are held together by their deep interest in the field, practically without any kind of formalities (it does not even have a membership fee). Those who have carried out or are carrying out, or directing, Hungarian astronautic activity--all the way from the planning of equipment to the selection of pilots--from an official position or on state commissions, have been for long, without exception, members of KASZ; or if they are not, they turn with confidence and great benefits to this organization that is now almost 4 decades old.

The anniversary will be in May 1981, when a large number of jubilee celebrations will be held together, and therefore KASZ has scheduled a scientific conference on the occasion of the 20th anniversary of Gargarin's space flight and the 100th anniversary of the birth of Albert Fono and Todor Kerman.

A preliminary review, prior to the spring mass review of KASZ, shows that there are now about 500 experts in Hungary who are occupied with astronautics. Some of them are well known to the public because--although the dissemination of information is not the main task of KASZ--the members gladly give talks on the new results of their science via radio, television, and the most varied kinds of newspapers.

6691
CSO: 2502

VT 20 MICROCOMPUTER SYSTEM AT ZAHONY TRANSLOADING STATION

Budapest SZAMITASTECHNIKA in Hungarian Jun 80 p 6

[Text] Complementing the article on the Automatized Information System of Zahony that appeared in SZAMITASTECHNIKA, Vol XI, No 4, we will describe the development of the VT [Videoton] 20/20 microcomputer at the SZAMKI [Computer Technology Research Institute].

The Task

The task of the information centers (IK) to be developed in the Zahony transloading area is to meet the demands of data registration (data on the trains), information and operative decision preparation that follow from the local technology. It is practical to use in these places an intelligent terminal with complex functions which will relieve the central power resources in a way that itself will partly meet the demands above.

What kind of hardware and software are needed to carry out this task?

Considering the large number of input data (approximately 400,000 kar per day), data input must be done at several points.

Because of the diversity of the preprocessing, the collected data must be put in temporary storage which necessitates the use of a high-capacity (5-10 Mbyte) background.

The large number of functions to be carried out simultaneously demands an efficient distribution of power resources.

Contact with the central computer and minimalization of data input and feedback time demands a high-level disconnecting system within the intelligent terminal.

For making local conversions and proofs, an input/output with punched tape and a possibility for pressing are needed.

The above requirements are completely satisfied, as far as the hardware is concerned, by the VT 20/20 microcomputer system recently developed by the Videoton. The structure of the system is shown in Figure 1.

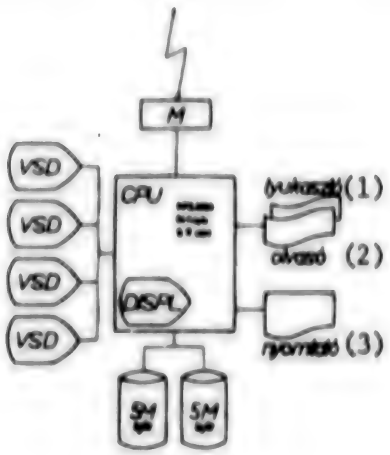


Figure 1

Key:

1. Puncher
2. Reader
3. Presser

The microcomputer's disconnecting system aids in serving the real-time environment, and the simultaneous implementation of the various tasks must be carried out by the software system with time division built on this disconnecting system.

On the basis of the above, the software system is based on two fundamental modules: the governing monitor and the cluster of the user's procedures.

The connection between the technological system at Zahony's border region and the VT 20/20 is shown in Figure 2.

The Control

The real-time clock of the VT 20/20 CPU controls the pace of the 12 programs that run simultaneously. The amount of the time period given for the individual programs is dynamically changed according to the existing situation. This makes it possible to use the CPU as a source of power most efficiently. The operation of the periphery is put on a logical level by the monitor toward the user's level. The periphery handlers connected with the disconnecting system operate into the buffer area and in certain cases--when the time parameters of the processing make it necessary--direct connection can be made between the disconnecting system and the programs.

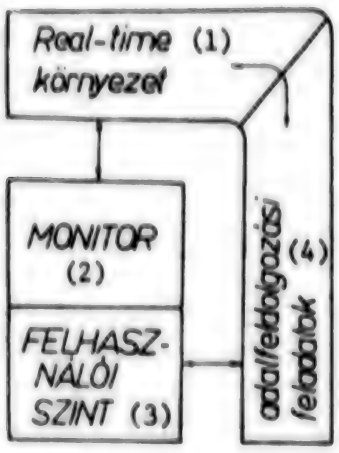


Figure 2

Key:

1. Real-time environment
2. Monitor
3. Level of use
4. Data-processing tasks

The governing monitor also guides the background storage toward a higher level and handles the libraries of the sequential and index-sequential stocks.

The system's input data are collected at each work unit, waiting to be controlled and forwarded as a temporary stock of the sequential library. Some of these data change the stock of the local data base according to the construction of the information system; obtaining local information on this data base is also possible. This is the point from which the given procedure of the user's level puts together the various registers and tables. (The structure of the governing monitor is shown in Figure 3.)

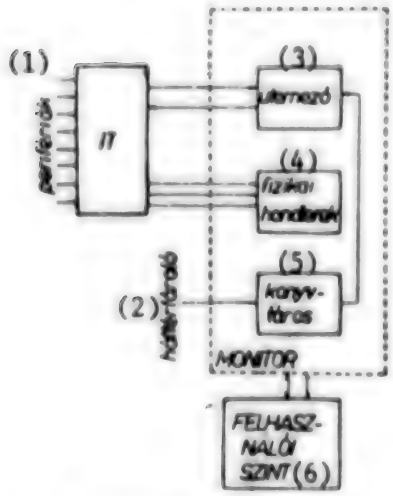


Figure 3

Key:

1. Peripherals
2. Background storage
3. Pacer
4. Physical handlers
5. Librarian
6. Level of use

Pacing

The pacing system can distribute the CPU's power sources simultaneously between any number--12 at present--of active programs. From the aspect of pacing, a program may be either active or waiting. The time division between the active programs is done according to the so-called "round robin" algorhythm, and every pace has the same priority. The pacer reaches the programs through a "control block" that is in a table which also includes, in addition to the actual program characteristics, chain pointers regarding the table of the next active program. The programs' transitions from one to another state are done through disconnection from or connection to this chain. (Figure 4)

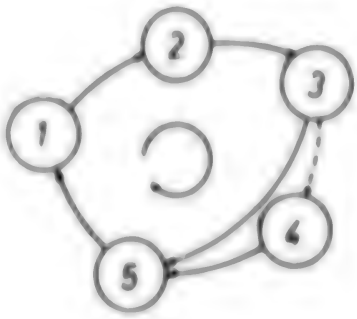


Figure 4

Those procedures which are taking place in the real-time environment, receive the command of activation or waiting directly from the periphery handlers. The answering time may be reduced this way. If a program is put in the state of waiting, another program waiting for a run can take its place. This strategy of pacing and the technique of chaining optimizes the pacer's administrative activity at full load.

Procedures of Use

Every procedure is connected to one or another well-separable function and may include several programs running simultaneously. As far as its construction is concerned, a procedure is made up of a leading program and possibly one or more serving programs. These serving programs, according to the need, separate from the main body into a separate time period. They may be storage residents or the elements of the program library. The difference between the two is in the frequency of use. (Figure 5)

What procedures are necessary on the user level? These are: receipt of data, control, change, storage arrangement and data forwarding.

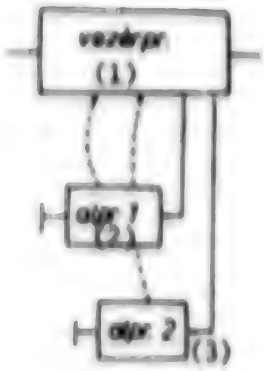


Figure 5

Key:

1. Leading program
2. Secondary program 1
3. Secondary program 2

The procedure for receiving data is related to the real-time environment and its task is to receive and put into background storage the data on cars, locomotives and loads resulting from train movements in the border region. This procedure has at least as many parallel programs as the number of work units that collect data simultaneously.

The control and changing procedure checks the completed records and, in case of a mistake, it requests a change and makes a statistical record of the mistake. The collection of data for transmission and the necessary filling of the data base is done by a separate procedure and, finally, the procedure doing the data transfer handles the data waiting to be forwarded and builds the incoming line for the procedure that does the storage and ordering. The data-transferring algorhythm is the IBM's multipoint BSC algorhythm.

The structure described above is not for itself; it must be put into some kind of human environment and thus the activization and stopping of the functions and the selection of the modus operandi of the individual work units must be taken care of.

The leading procedure that is supporting the function of the entire system is activated immediately after it is turned on and writes on the screens the selected operation of the individual work units. By selecting the suitable operation (data input, information, etc.), it directs the appropriate procedure to the given work unit which then will be connected to that module. At the end of each function, before the procedure ends, it reconnects the work unit with the leading procedure so that a new operation can be selected.

Goals and Plans

The primary objective of the development at the SZAMKI is to design a software system for the VT 20/20 microcomputer which uses the concept of the so-called "open-ended design." This will make it possible to do other kinds of operations of a similar size with a minimum change of structure affecting the user's level.

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CAPABILITIES OF ESZ MAGNETIC TAPE STORES, DRIVES

Budapest SZAMITASTECHNIKA in Hungarian Jun 80 p 4

[Report by Peter Keszthelyi]

[Text] The series of articles introducing the ESZR peripheries up to now dealt with the slow (multiplex) peripheries. We will now introduce the fast peripheries. Their basic characteristic is that they possess a high speed of data transfer (tens, or even 100 Kbytes per second) and are suitable for block data transfer, that is, a transfer of several bytes. Block data transfer is necessary, for if we start the mechanical movement in these peripheries, then the change of information must be continuous. In this case, the channel can accommodate only one periphery. The selector channel is capable of this.

The magnetic tape periphery is the computer's background storage, with a great capacity of data storage. The magnetic tape storages are suitable for information input, output and storage. The data are set on the magnetic tape parallel at each byte (parity bittel) and the setting happens in the way of NRZI (Non-Return-To-Zero-Inverse). The time to reach the data is relatively long. The tape units exchange information in the commands of "write," "read" and "read backwards." The magnetic tape equipment has, in accordance with information fixing, parallel writing and reading heads in one unit (head unit). At fast rewinding and tape threading, the head unit withdraws from the tape. The removable protecting ring on the spool prevents the unwanted rewriting of the tape.

The tape-moving mechanism is a sensitive part of magnetic tape storages; this is what makes it possible to wind the tape back and forth rapidly without "jerks." Buffers help to prevent tearing the tape in fast stops and starts. At the beginning, mechanical tape buffers were used; they are now vacuum governed and this reduces physical wear. The tape is generally driven by a one-roller mechanism powered by a DC motor with the aid of a power regulator. The tape's feeding system is under overpressure and this helps keep the dust out.

The tape units are connected to their governors through the so-called small interface. The governor maintains the connection with the selector channel. The small interface is also an ESZR standard, in accordance with ISO recommendations.

Many kinds of magnetic tape storages have been developed in the ESZR such as, for example, the ESZ 5002, 5003, 5004, 5010, 5012, 5014, 5016, 5017, 5019, 5021 and 5022. Of these, the ESZ 5002, 5003, 5004, 5014, 5021 and 5022 are not available in Hungary. The ESZ 5010 was the storage of the ESZ 1020 computer. Two models of the ESZ 5012 are known, the ESZ 5012 and the 5012-01. Both models are made in the USSR; the ESZ 5012-01 is an up-dated version of the ESZ 5012. The ESZ 5017 has three models, the ESZ 5017, 5017-01 and 5017-02. The latter two are made in the GDR under Soviet license. The Czechoslovak ESZ 5004 is the most up-to-date equipment. This is capable not only of NRZI but also of phase-coded setting. Tape threading is entirely automatic, as is the opening of the tape's protecting ring and thus the latter must not be removed before threading. The part of the magnetic tape storages that is most prone to mechanical malfunction is the vacuum buffer storage/ regulator and the coupler connector. The technical data of the storages are shown in Table 1.

The task of the control equipment is to make the connection between the magnetic tape storages and the channel. Connection with the channel is maintained through the standard interface; the storages are connected through the small interface. The control equipment "connects" only one storage with the channel simultaneously. A maximum of eight storage units may be connected to one governor. The governor recodes the channel's commands into control codes understood by the tape units, and it maintains--and checks--the exchange of information between the channel and the storages. The governor is capable of controlling storages even in off-the-line plants and thus repairs do not disturb the central unit.

Several kinds of magnetic tape governors have been developed in the ESZR: the ESZ 5503, 5511, 5512, 5514, 5515, 5516, 5517 and 5521 code numbers. Of these, only the ESZ 5503, 5514 and 5516 are not available in Hungary. The ESZ 5503 is the governor for the ESZ 5002, 5003 and 5004 storages which also employ phase-coded setting. The most frequent mechanical malfunctions are breakdowns of the integrated circuit and the connector. The technical data of the governors are shown in Table 2.

Table 1

Type	ESZ 5010	ESZ 5012 5012-01	ESZ 5016	ESZ 5017 5017-02	ESZ 5019	ESZ 5022
Access time (sec)	75	75	250	75	X	X
Tape speed (mps)	2	2	1.524	2	3	2
Signal density (bit per mm)	8 or 32	8 or 32	32	8 or 32	8,22,32	NRZI: 32 Phase coded: 63
Setting method	NRZI	NRZI	NRZI	NRZI	NRZI	NRZI or phase coded
No. of channels	9	9	9	9	9	9
Transfer speed (Kbyte per sec)	64	64	48	64	120	NRZI: 64 Phase coded: 126
Stopping speed (sec)	25-30	12.6-15.7	12.7-15.2	12.7-19.2	15.2	min.12.7
Block gap (mm)	6	X	5	5	X	X
Acceleration time (sec)	6	X	5	5	X	3
Tape size						
—length (m)	732	750	750	750	750	732
—width (mm)	12.7	12.7	12.7	12.7	12.7	12.7
Max. outer spool diameter (mm)	267	296	296	296	296	267
Checking			by the governor			
Two-direction reading	x	x	x	x	x	x
Governor model	ESZ 5511	ESZ 5517	ESZ 5516 5521	ESZ 5511 5517	ESZ 5517 5519	ESZ 5503
Made in	USSR	BDR	GDR	(a) USSR (b) GDR	PDR	CSSR

Note: X - Unknown

Table 2

Type	ESZ 5511	ESZ 5512	ESZ 5516	ESZ 5517	ESZ 5521	ESZ 5503
Method of connection with channel	standard I/O interface					
No. of parallel functions	1	1	1	1	1	1
	(the other storages in the meantime do the functions of "respooling" or "respooling and tape change")					
Connectable storages						
--number (each)	8	8	8	8	8	8-16
--model	ESZ 5010 5012	ESZ 5012	ESZ 5016 5017 5021	ESZ 5010 5012-01 5017 5017-02 5019 5022	ESZ 5016	ESZ 5002 5003 5004
Possibility of mixed connections	x	x	x	x	x	x
Max. transfer speed (Kbyte per sec)	64	64	96	128	64	315
Made in	USSR	BDR	USSR	USSR	GDR	CSSR

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COMPUTER SITUATION FOR 1979 REPORTED

Warsaw WIADOMOSCI STATYSTYCZNE in Polish No 8, Aug 80 pp 32-35

[Article by Dr Jan Iszkowski of the Research and Development Center of the State Statistical Information System, Central Office of Statistics: "Computerized Information Centers in 1979"]

[Text] The annual study of computerized information centers treated the state of 1,896 centers at the end of 1979, or 5 percent more than at the close of 1978. After the exclusion of reports from centers employing up to 4 persons which had no computers, reports from 1,523 centers, employing a total of 56,098 workers in 1979, were studied.

Table 1. Computerized Information Centers and Employees

Specifications	1975	1976	1977	1978	1979
			In absolute figures		
Centers	1,031	1,252	1,365	1,468	1,523
Employees (in thousands)	40.4	46.2	50.5	55.5	56.1
			The previous year: 100		
Centers	136	121	109	108	104
Employees	115	114	109	110	101

Source: Data from the Research and Development Center [OBR] of the State Statistical Information System [SPIS]

These data indicate that in 1979 the growth rate of a number of centers underwent a significant reduction, with an increase in employment in particular being checked in these centers. This resulted in a reduction in the average size of a center, which employed 37.8 workers in 1978, and 36.8 workers in 1979. Table 2 represents the change in the structure of centers according to the classes of center size in existence from 1976-1979.

Table 2. The Number of Centers According to the Classes of Center Size

Classes of center size according to the number of employees	1976	1978	1979	1976	1978	1979
	in absolute figures			in percentages		
In general	1,252	1,468	1,523	100.0	100.0	100.0
Below 5	212	177	180	16.9	12.1	11.8
5- 10	319	471	475	25.5	32.1	31.2
11- 20	259	277	305	20.7	18.9	20.0
21- 50	240	273	283	19.2	18.6	18.6
51- 100	113	142	154	9.0	9.7	10.1
101- 200	67	74	76	5.3	5.0	5.0
201- 500	37	49	44	3.0	3.3	2.9
Over 500	5	5	6	0.4	0.3	0.4

Source: Data from OBR SPIS.

Shifts in the above-noted structure last year were minimal. The share of centers which are independent accounting units decreased insignificantly; it stands at 8.5 percent (in 1978 it was 8.6 percent). The share of centers which have no computers decreased from 3.5 percent to 3.4 percent. In a distribution according to ministries, a minor series of shifts occurred which Table 3 presents for the major ministries.

From shifts in the structure of centers according to their territorial distribution, we may infer an insignificant increase in the share of voivodships, in which computerized information centers are less developed.

The directions of activity reported by computerized information centers indicate that the multidirectionality of activities is being maintained. They also show that among the directions which have undergone the greatest expansion, in addition to data processing on computers and the use of computers for controlling production processes, is that of organizational counsel and the coordination of labors in the sphere of information science.

Table 3. The Share of Selected Ministries in the Total Number of Computerized Information Centers and the Totals of Employees in These Centers in 1979

Ministries	Share in the number of centers in %	Difference in % points from 1978	Share in the number of employees in %	Difference in % points from 1978
In general	100.0	x	100.0	x
including the ministries of:				
Machine Engineering Industry	16.8	-1.1	14.1	-0.2
Science, Higher Education and Technology	7.8	+0.1	15.3	0.0
Construction and Construction Materials Industry	7.6	+1.0	7.4	-0.3
Chemical Industry	7.4	0.0	4.5	0.0
Light Industry	7.4	+0.1	3.2	0.0
Heavy and Agricultural Machine Industry	7.0	-0.9	5.6	-0.8
Power Industry and Atomic Energy	5.9	+1.1	4.0	+0.9
Metallurgy	4.1	-0.1	4.5	-0.1
Food Industry and Purchases	3.8	-0.1	1.9	+0.1
Forestry and Timber Industry	3.7	-0.2	1.1	0.0
Agriculture	3.3	+0.1	1.6	+0.1
Transportation	3.3	+0.1	5.5	+0.2
Communications	3.2	-0.1	3.3	-0.1
Central Office of Statistics	2.6	-0.1	6.8	-0.4
Mining	2.5	-0.2	4.5	+0.1
Administration, Local Economy and Environmental Protection	2.1	0.0	2.5	+0.1
Foreign Trade and Maritime Economy	2.0	-0.1	1.4	0.0
Other Ministries	9.5	+0.2	12.8	+0.4

Source: Data from OBR SPIS.

Table 4. Share of Selected Voivodships in the Total Number of Computerized Information Centers and of Employees in Information Science in 1979.

Voivodships	Share in the number of centers in %	Difference in % points from 1978	Share in the number of employees in %	Difference in % points from 1978
In general	100.0	x	100.0	x
Warsaw--capital	19.7	-0.3	24.1	-0.3
Katowice	11.8	+0.2	13.8	-0.2
Lodz--municipal	7.3	-0.1	6.0	0.0
Poznan	5.9	0.0	5.0	-0.1
Krakow--city	5.7	-0.6	5.8	-0.1
Wroclaw	5.1	-0.1	7.1	+0.1
Gdansk	4.9	+0.4	5.5	+0.2
Bydgoszcz	3.3	-0.3	3.7	-0.1
Bielsko-Biala	2.6	0.0	1.8	+0.2
Opole	2.3	0.0	1.3	0.0
Lublin	2.0	0.0	2.0	+0.2
Other voivodships (38 voivodships)	29.4	+0.8	23.9	+0.1

Source: Data from OBR SPIS.

Table 5. Computerized Information Centers According to Kinds of Activity

Kind of activity	1977	1978	1979	1978=100
	in absolute figures			
Centers in general	1,365	1,468	1,523	104
operating in the sphere of:				
Designing and programming computer systems	932	907	947	104
Designing and programming systems for perforated card machines	68	58	49	85
Processing data on computers	811	809	878	109
Processing data on perforated card machines	119	74	61	82
Creating carriers of information	1,114	1,158	1,206	104
Training cadres for information	141	172	182	106
Conducting research-developmental efforts	318	290	302	104
Organizational counsel	167	180	209	116
Coordinating efforts in the sphere of information science	355	407	486	119
Installation, maintenance and repair of computers	-	249	245	98
Using computers for controlling production processes	-	56	60	107

Source: Data from OBR SPIS.

Although deliveries of computers for domestic consumers in 1979 were generally lower by 2.4 percent than in 1978 (and 50 percent lower than in 1975), we have continued to note an increase in the average equipping of centers with computers. For every 100 centers the number of computers was:

92 -- in 1975
124 -- in 1976
138 -- in 1977
143 -- in 1978
150 -- in 1979

The following represents the picture with regard to the possession of computers by information centers:

Table 6. Computers in Information Centers

Computers	1975	1976	1977	1978	1979
	In				
In general	944	1,547	1,890	2,092	2,282
large and mid-size	514	623	708	756	812
minicomputers	430	924	1,182	1,336	1,470
	Previous year = 100				
In general		164	122	111	109
large and mid-size		121	113	107	107
minicomputers		215	128	113	110

Source: Data from OBR SPIS.

Table 7. Structure of the Computer Park by Age

Years	In general	Computers by number of years old: 1-3	4-5	6-8	9-10	11-15	over 15
		in percentages					
		Computers in general					
1977	100.0	57.1	27.5	9.3	3.6	1.7	0.8
1978	100.0	35.1	43.5	16.2	3.1	1.8	0.3
1979	100.0	26.2	41.0	26.6	3.3	2.5	0.2
		Large and mid-sized computers					
1978	100.0	30.3	31.7	24.0	8.3	5.0	0.7
1979	100.0	21.6	29.8	32.1	9.0	6.9	0.6
		Minicomputers					
1978	100.0	37.9	50.2	11.8	-	-	0.1
1979	100.0	28.8	47.3	23.7	0.2	-	-

Source: Data from OBR SPIS.

The growth of the state of computer possession was influenced primarily by an increase in the number of computers installed of the types:

Odra 1305 with 17 units
R-32 with 18 units
Mera 305 with 38 units
Mera 400 with 63 units

The relatively minor fall in the increase of the number of computers in 1979, by comparison to supplies of them, arose from the installation of a number of computers in that year which had been manufactured in former years, primarily in 1978; nonetheless this increase was, for example, more than 3-fold less that of 1976. The halt in the increase of the number of computers in information centers reflects unfavorably on the structure of the age of the computer park. The dominant class in this regard is the class 4-5 years old, and in the case of large and mid-size computers, the class 6-8 years old. As far as computers are concerned this is an old class.

The graph (Figure 1) which demonstrates the rapidly narrowing foundation of the "age pyramid" of computers, represents the structure of age still more clearly than the above table. This graph clearly delineates the picture of a fall in the number of computers, particularly large and mid-size computers, over several years, to the extent that supplies of machines are not essentially increased. Supplies at present do not guarantee--on a long-range scale--even the simple reproduction of the park of large and mid-size computers.

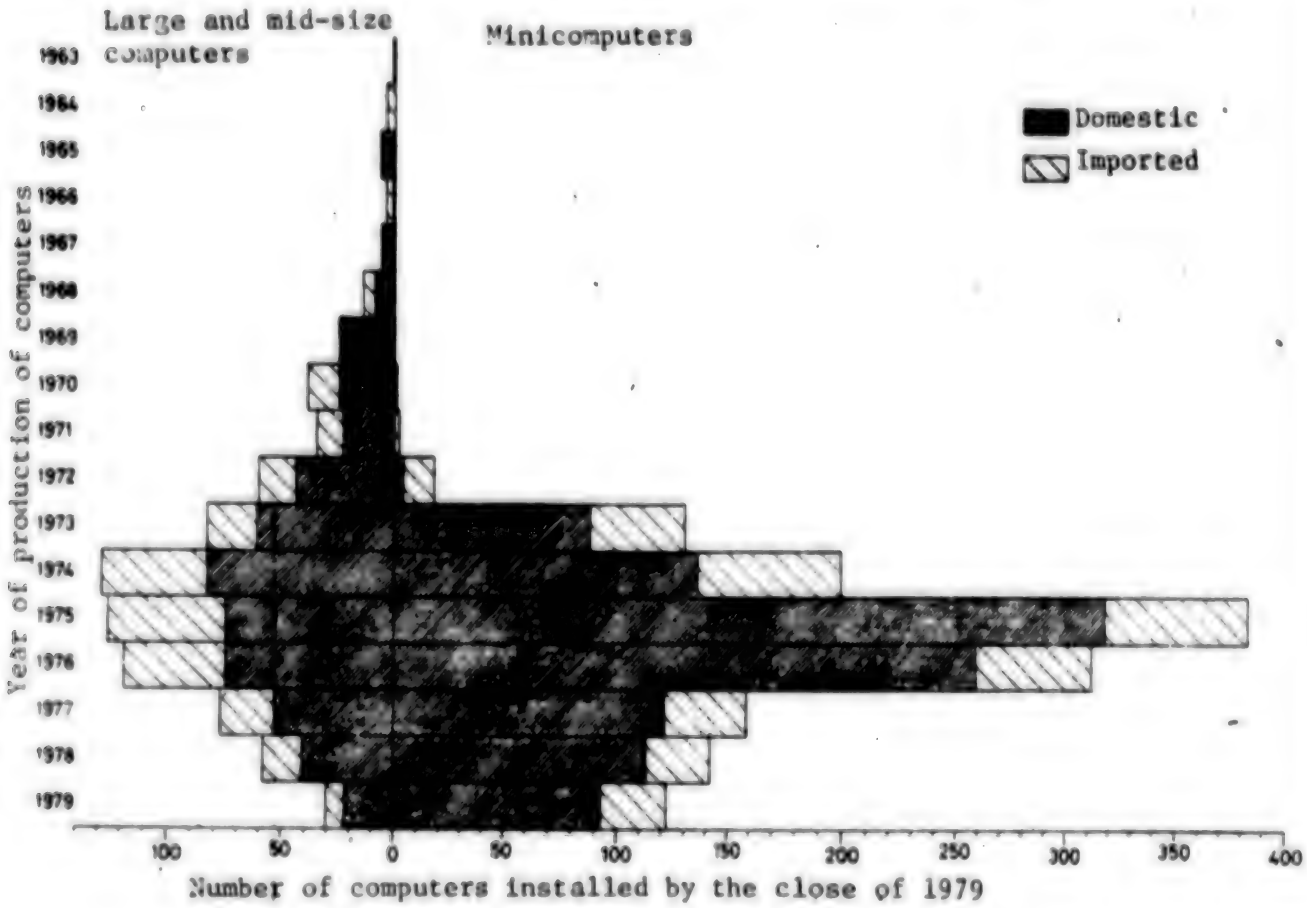

Figure 1. Age Structure of Computers in Information Centers

Changes in the structure of the size of the internal memory of computers, according to the classes of the capacity of this memory, primarily consist of an increase of the share of computers of class 257-512 kilobits and of class 8-64 kilobits. On the other hand, the share of computers with the largest and mid-size memories is decreasing. This is illustrated by Table 8.

Table 8. Computers according to Classes of Internal Memory Capacity

Specifications	Years	In general	According to classes of internal memory capacity in kilobits: 8-64	65--256	257--512	over 512
Number of computers	1978	2,092	1,413	501	160	18
	1979	2,282	1,539	521	203	19
Structure (in percentages)	1978	100.0	67.5	23.9	7.7	0.9
	1979	100.0	67.4	22.8	9.0	0.8
Internal memory capacity in megabits	1978	177.5	25.6	66.1	57.9	27.9
	1979	189.9	31.6	69.5	73.3	15.5
Structure (in percentages)	1978	100.0	14.4	37.2	32.6	15.8
	1979	100.0	16.6	36.6	38.6	8.2

Source: Data from OBR SPIS.

The increase in devices for the preparation of machine data carriers (generally by 3 percent) is characterized by a very important increase in the number of multi-position registers and card punch-verifier units, as well as of bookkeeping and invoicing machines and the like.

Table 9. Equipping of Computers with Input, Output and Input-Output Devices (state at the close of the year)

Specifications	1978	1979	1978=100
	in absolute figures		
In general	9,693	10,506	108
Input devices	2,855	3,078	107
Readers	2,841	3,067	108
including: paper tape readers	1,806	1,932	107
Graphic input devices	14	11	79
Output devices	4,386	4,887	111
Perforators	1,839	1,995	109
including: paper tape perforators	1,557	1,657	106
Printers	2,072	2,470	119
including: line printers	1,992	2,396	120
Screen monitors	235	253	108
Graph plotters	88	106	121
Other	152	63	41
Input-Output devices	2,425	2,541	105
Readers-Perforators	353	370	105
including: readers of paper tape perforators	329	347	106
Teleprinters	352	305	87
Consoles	947	1,121	118
with a typewriter	687	781	114
with a monitor	260	340	131
Other	773	745	96

Source: Data from OBR SPIS.

Table 10. Devices for the Preparation of Machine Carriers in Information Centers in Units

Specifications	1977	1978	1979	1978=100
	in absolute figures			
In general	14,339	16,399	16,922	103
including:				
Uni-position registers	36	59	63	107
Multi-position registers	89	211	284	135
Card punches	6,487	6,892	6,833	99
Card verifiers	4,098	2,882	3,879	99
Card punch-verifier units	98	64	85	132
Card punches, verifiers and tape punch-verifier units	506	552	423	76
Bookkeeping, invoicing machines, automatic accounting and business machines	1,891	3,395	4,127	122
Automatic writing machines, teleprinters, flexowriters	877	964	930	96
Punch-adders	205	308	224	73

Source: Data from OBR SPIS

The number of devices for the teletransmission of data in information centers has increased significantly.

The number of input devices, output devices and input-output devices has increased by approximately 8 percent, which roughly corresponds to the growth in the number of computers. The growth of the state of possession of line printers, graph plotters and consoles with monitors is worthy of mention.

Table 11. Devices of the Teletransmission of Data in Information Centers

Specifications	1977	1978	1979	1978=100
	in absolute figures			
In general	1,605	2,413	3,127	130
Intelligent terminals	33	44	56	127
Non-intelligent terminals	840	1,161	1,224	105
including dialogue terminals	495	905	852	94
Devices controlling the transmission of data	121	225	347	154
Convertors of binary signals	611	983	1,500	153

Source: Data from OBR SPIS.

At the same time the number of intelligent terminals, devices controlling data transmission and convertors of binary signals in existence increased in particular.

Indexes of the use of work time of computers in 1979 essentially remained at 1978 levels. A slight improvement in the utilization of large and mid-size computers was noted (from 13.1 hours to 13.3 operating hours per work day) and an insignificant reduction in the use of minicomputers was noted (from 6.5 to 6.4 operating hours per work day). These results would certainly be more favorable, were it not for numerous interrupts in operation and an increased failure rate which occurred during the first quarter of the year in particular due to numerous current shutoffs. Among the causes of stoppages, stoppages resulting from organizational causes were of somewhat less significance than in 1978 (their share was reduced from 12.3 percent in 1978 to 10.9 percent), with stoppages for technical reasons being of greater significance (an increase from 12.3 percent to 12.6 percent). These changes are appreciable particularly in the case of minicomputers and imported computers. The operating shift rate, however, which according to estimates averaged 1.5 shifts (with 1.9 for large and mid-size computers and 1.2 for minicomputers) has a basic influence on the use of operating time during the course of the day. The operating shift rate in turn depends not only on the imposition of instructions but also on the employment possibilities of workers. The highest operating shift rate of large and mid-size computers occurs in the centers of: the Association for Information Science (2.7), the Ministry of Construction and the Construction Materials Industry (2.5), the Ministry of Mining and the Ministry of Transportation (2.3), the Central Office of Statistics and the Ministry of Metallurgy (2.2), the Ministry of the Chemical Industry (2.1) and the Ministry of Communications (2.0). Minicomputers, on the other hand, are used for more than 2 shifts (2.2 shifts) only in the Ministry of Mining and Ministry of Metallurgy.

The structure of the use of operating time of computers evidences the greatest share of usage in controlling production processes, while in management it is used extensively for financial settlements and materials management. Changes in this structure are fairly slow to occur.

Table 12. The Structure of Operating Time of Computers according to Kinds of Matters for Processing

Matters for processing	1977	1978	1979
	in percentages		
In general	100.0	100.0	100.0
Controlling production processes	16.4	17.0	18.1
Design labors, engineering and scientific calculation	16.5	19.4	17.6
Management	67.1	63.6	64.3
including the following systems:			
multi-range	3.2	2.8	3.2
the technical preparation of production, planning and control of the execution of production plans	9.5	8.7	8.3
materials management	14.7	12.9	12.7
goods management	4.7	5.2	5.1
management of fixed assets	2.3	1.8	1.8
financial settlements	10.3	13.0	13.8
cadre management	6.2	5.1	4.8
statistics and statistical analysis	8.6	7.0	7.2

Source: Data from OBR SPIS.

The value and the sale of computerized information increased in 1979 at a significantly slower rate than in the years 1978 and 1977, while, unlike in 1978, costs of the execution of labors and services increased more than the value of the sale of services.

Table 13. The Value of Labors and Services, the Value of Sale and the Costs of the Execution of Labors and Services of Information Centers

Specifications	1976	1977	1978	1979
	In billions of zloty			
Value of labors and services	7.9	10.2	12.6	13.8
Sale of services	4.2	5.3	7.0	7.5
Costs of the execution of labors and services	6.8	8.9	11.2	12.3
	The previous year = 100			
Value of labors and services	-	128	123	110
Sale of services	-	126	134	106
Costs of the execution of labors and services	-	131	125	110

Source: Data from OBR SPIS.

The continued systematic growth of the share of materials costs is noted, particularly with regard to the costs of depreciation and the costs of operating materials.

Table 14. The Structure of Costs of the Execution of Labors and Services of Information Centers

Groups of costs	1976	1977	1978	1979
	in percentages			
Costs of execution				
In general	100.0	100.0	100.0	100.0
Non-materials costs	45.2	42.0	39.1	38.7
including the wage fund	30.8	29.2	27.5	27.3
Material costs	54.8	58.0	60.9	61.3
including: foreign services	15.7	15.4	16.2	15.7
depreciation	22.2	26.6	28.9	29.9
operating materials	9.1	8.7	9.0	9.1

Source: Data from OBR SPIS.

These latter costs are increasing, despite the fact that, for example, the supplies of paper materials in the past year decreased by nearly 1 percent, which with regard to the continued increase in the production potential of information centers creates serious difficulties.

Table 15. Turnover of Employees in Information Centers

Groups of employees	1975	1977	1978	1979	1975	1977	1978	1979
	hiring factor				dismissal factor			
In general	30.7	22.9	20.0	19.5	19.4	16.4	15.8	18.9
including:								
Analysts and systems designers	26.9	17.0	11.7	12.0	17.5	13.4	10.9	14.1
Programmers	33.0	24.0	18.8	17.0	18.1	16.4	14.6	16.9
Operators	35.4	27.2	25.9	26.7	21.3	19.4	20.0	24.4
Maintenance personnel	32.8	22.7	18.4	17.4	16.7	14.3	14.3	15.7

Source: Data from OBR SPIS.

In 1979 a growing instability of personnel was noted by comparison with former years. To the extent that on the one hand hiring factors decreased (which is the natural result of the checking of the growth of employment), to that same extent the increase of dismissal factors occurring in all fundamental groups of employees is disturbing. These data are represented in Table 15.

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